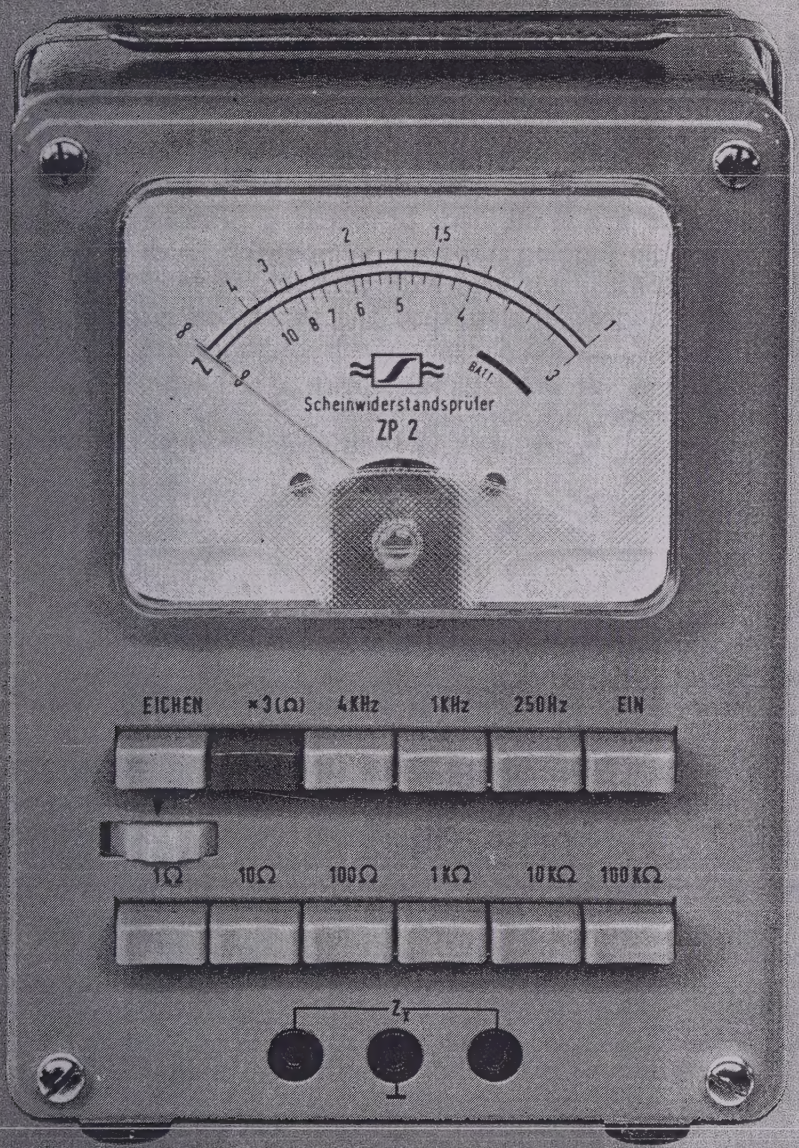


Transistorized Portable Impedance Tester Model ZP 2

Instruction Manual

SENNHEISER electronic

Introduction and Application

The Model ZP 2 impedance tester is used for the simple determination of impedances. The scale is calibrated in ohms, and may be read directly. The tester is especially suited for use in all kinds of matching problems. Because of the instrument's negligible loading, sensitive components, such as microphones, tape heads, and transformers with high-permeability iron cores, can be measured with a high degree of accuracy. The tester can also be used for rapid determination of R, L, and C components of reactance, by using the following formulae:

$$Z_L = \omega \cdot L$$

$$Z_C = \frac{1}{\omega \cdot C}$$

The matching resistance of an unloaded transformer can be determined by measuring the unloaded transformer impedance Z_o and the shorted impedance Z_k by means of this formula:

$$Z = \sqrt{Z_o \cdot Z_k}$$

Technical Data

Measuring frequencies	250 cps ($\omega = 2\pi f = 1{,}570$) 1,000 cps ($\omega = 6{,}280$) 4,000 cps ($\omega = 25{,}000$)
Range of measurement Resistances and impedances of	1 Ω to 1 MΩ
Capacitances of	40 pf to 650 μf
Inductances of	40 μh to 650 hy
Accuracy	± 5 % with 1,000 cps test frequency ± 10 % with test frequencies of 250 cps and 4,000 cps
Loading on component under test	max. 90 μVA
Permissible power supply range	7–9 V
Transistors used	5– SFT 337, 1– AC 117
Dimensions	8 5/8" x 6 1/8" x 4 1/2"
Weight	5.5 lbs

Description

Function

The instrument applies the principle of determining resistance by measuring the current through an object with a constant applied voltage. When the voltage is AC, this principle can be used to measure impedances as well as resistances. To prevent erroneous measurements due to changes in impedance, the generator output voltage and the amplifier input sensitivity are changed by the range switch, so that the loading of the object or circuit under test is never more than 90 μVA.

The Circuit

In the ZP 2, an R-C generator is used to supply the test voltage. A voltage-regulator bulb in a bridge circuit provides a constant output. The possibility of switching among three different test frequencies facilitates easy identification of the reactive component, enabling differentiation between C and L, since Xc and XL change in opposite directions with changes in frequency.

The object to be tested is connected between two transformers, and the test voltage is applied to one of them. The other transformer, which has a low impedance, is connected in series with the object being measured. The voltage induced in the second transformer is dependent upon the voltage drop due to the current through the object, since the applied voltage is kept constant.

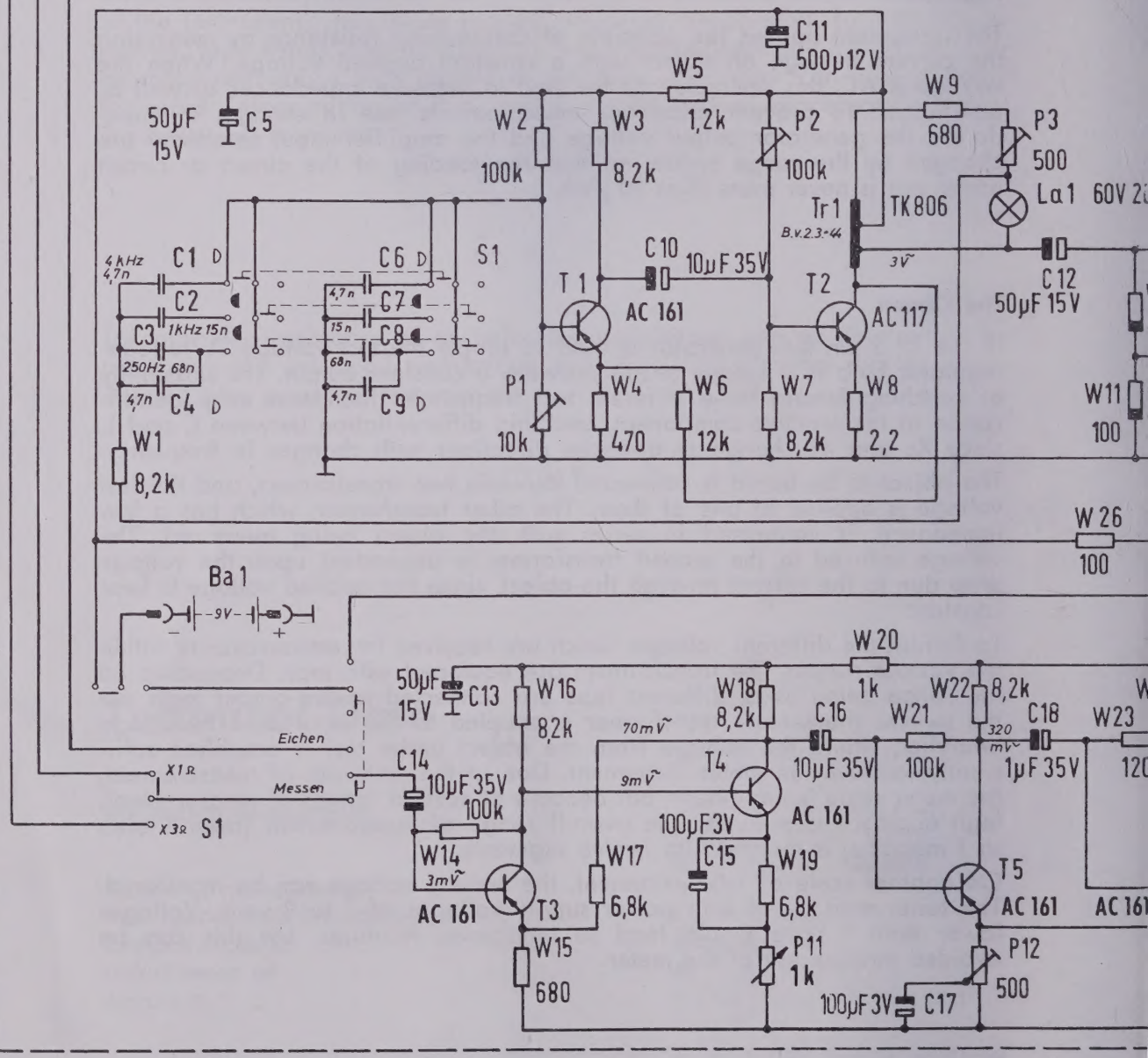
To furnish the different voltages which are required for measurements within the various ranges, the transformers are equipped with taps. Depending on the range being used, different taps are connected to the output jacks via the switch. The second transformer is coupled to the input of a four-stage amplifier, where the voltage from the object under test is amplified sufficiently to drive the meter movement. Due to the principle of measurement, the meter scale is non-linear, but because of several ranges of measurement, high accuracy is assured. The overall range of measurement (from 1 ohm to 1 megohm) is divided into twelve segments.

On another scale of this instrument, the battery voltage can be monitored. The tester works well with power supply voltages of 7 to 9 volts. Voltages lower than 7 volts would lead to inaccurate readings, but this can be avoided through use of the meter.

Physical Construction

The ZP 2 is mounted in a rugged steel case. On the front panel are jacks for connection of the test cables, and the pushbuttons which select the various test operations (as well as the ones used in calibration of the instrument and battery testing). The meter is also mounted on the front panel.

The rear of the case can be easily removed by loosening two screws, thus facilitating easy replacement of the batteries.


C11
500µ12V
W5
W9
50µF
15V
C5
W2
100k
W3
8,2k
1,2k
P2
100k
680
P3
500
La1 60V 2
Tr1
TK806
B.v.2.3-44
3V~
C10
10µF 35V
T1
AC 161
T2
AC117
C12
50µF 15V
4 kHz
4,7n
C1 D
C2
C3
1kHz 15n
250Hz 68n
4,7n
C4 D
C6 D
4,7n
C7
15n
C8
68n
4,7n
C9 D
S1
P1
10k
W4
470
W6
12k
W7
8,2k
W8
2,2
W11
100
W1
8,2k
W 26
100
Ba1
9V
Eichen
Messen
X1 R
X3 R
S1
W 20
1k
50µF
15V
C13
W16
8,2k
W18
8,2k
C16
10µF 35V
W21
100k
W22
8,2k
320 mV~
C18
1µF 35V
W23
70mV~
9mV~
T4
AC 161
C14
10µF 35V
100k
100µF 3V
C15
W14
3mV~
AC 161
T3
W17
6,8k
W19
6,8k
T5
AC 161
AC 161
W15
680
P11
1k
P12
500
100µF 3V
C17

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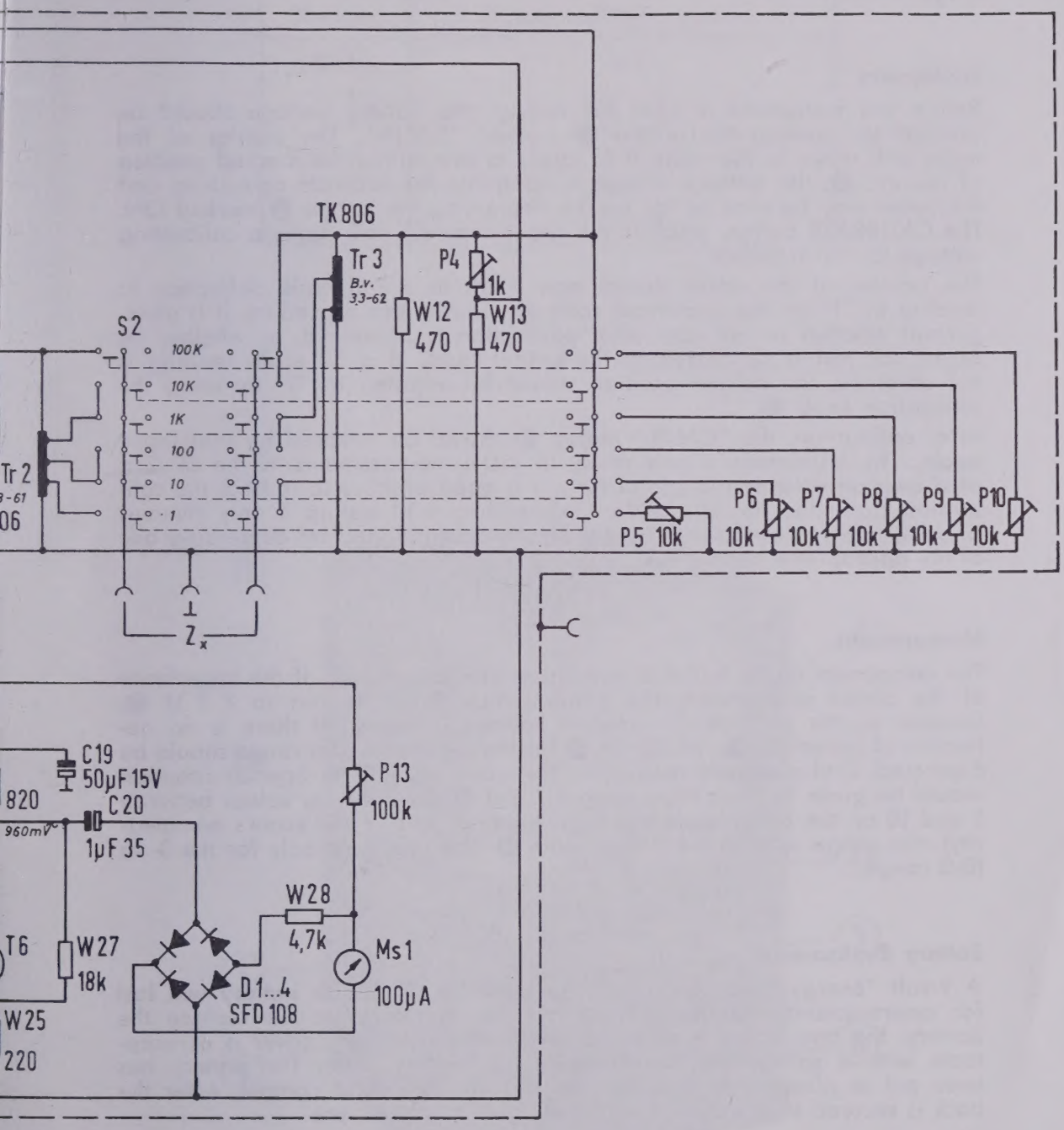

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24,25.	27	28,	P13,12,P4.	13,	P5.	P6.	P7.	P8.	P9.	P10.

Operation

Preliminary

Before the instrument is used for testing, the battery voltage should be checked by pushing the button ❶ marked "CALIB.". The pointer of the meter will move to the right. If it comes to rest within the marked position of the arc ❷, the battery voltage is adequate for accurate operation, and the tester may be readied for use by depressing the button ❸ marked ON. The CALIBRATE button, which is still depressed, will now apply a calibrating voltage to the amplifier.

The pointer of the meter should now move to a full scale deflection (a reading of "1" on the uppermost scale ❹). During this procedure, it is unimportant whether or not any other pushbutton is depressed, or whether an object for test is connected to the output jacks. If a full-scale reading is not obtained, the pointer position should be adjusted to "1" by using the calibration knob ❺.

After calibration, the "CALIB." button ❶ should be released by pressing it again. The instrument is now ready to make measurements. If the ZP 2 is used over an extended length of time, it is good practice to recheck the calibration from time to time. Before proceeding with testing it only remains to select the frequency to be used. This is accomplished by depressing one of the appropriate buttons ⓮.

Measurement

The component under test is connected across jacks Zx ❻. If the impedance of the object is unknown, the range switch should be set to X 1 Ω ❼, because in this position the applied voltage is lowest. If there is no deflection of the meter ❾, the button ❽ for the next successive range should be depressed, until a suitable reading on the meter is obtained. Special attention should be given to the button marked X 3 Ω ❿. Because the values between 3 and 10 on the upper scale are close together (due to the scale's nonlinearity), this range uses an additional scale ⓫. Use this scale only for the 3- to 10-Ω range.

Battery Replacement

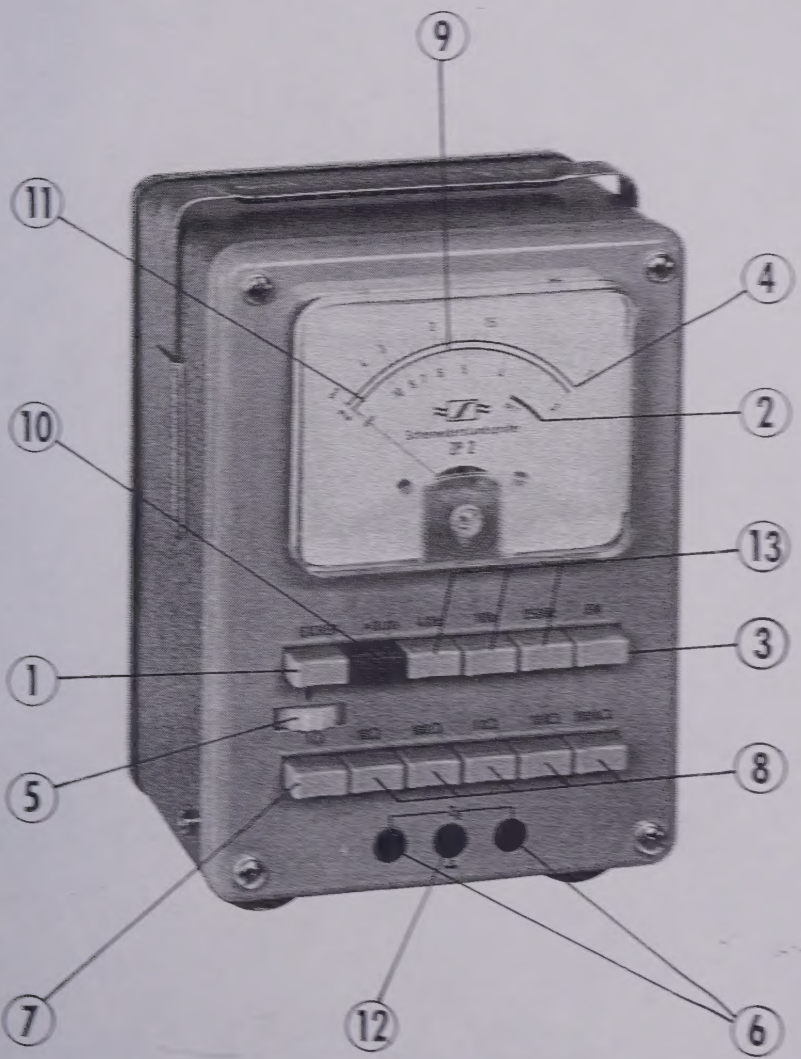
A 9-volt "energy pack" is to be used with the ZP 2. This battery will last for approximately 200 hours, with intermittent operation. To replace the battery, the back cover must be removed. Inside the rear cover is a receptacle with a safety lock, which holds the battery. After the battery has been put in place, a special fastener provides for good contact. After the back is secured to the case, the ZP 2 is again ready for use.

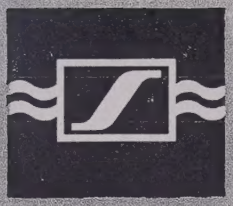
Use as a Test Generator

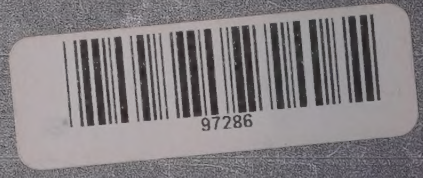
Besides its primary purpose, the ZP 2 can be used as an R-C generator. The AC voltage is available between the left jack and ground ⓬. The magnitude and frequency of this AC voltage is dependent upon the position of the range switches ❼, ❽ and the frequency selector buttons ⓭.

The following table gives the approximate output voltages:

Range:	Output voltage (approx.):
100 KΩ	3 V
10 KΩ	300 mV
1 KΩ	300 mV
100 Ω	30 mV
10 Ω	30 mV
1 Ω	3 mV







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